

Appendix I. Introduction

I. Introduction

This introductory document discusses existing regulations pertaining to feedlots, animal units as a normalizing parameter for number of animals, and appropriate analytical methods. It accompanies other documents developed to study the Feedlots Industry. These documents are a technical profile of the industry and available treatment and control technologies (Feedlot Industry Sector Profile), a statistical analysis of racetrack case study information, an economic profile of the industry (Preliminary Study of the Livestock and Poultry Industry), and an assessment of environmental impacts (Environmental Impacts of Animal Feeding Operations). Together, these documents summarize the information the U.S. Environmental Protection Agency collected in its study of the Feedlots Industry.

II. Existing Regulations and State Programs

The current Feedlots Effluent Limitations Guidelines were published in 1974 at 40 CFR 412. This regulation applies to large operations that raise animals. Section VI discusses which operations are covered by this regulation in more detail. The following table summarizes the requirements of the rule.

<i>If you raise</i>	<i>And your operation is</i>	<i>And you discharge or might discharge</i>	<i>Then you must</i>	<i>Or you may</i>
Cattle, swine, sheep, horses, chickens, or turkeys	Existing or New	Directly	not discharge process wastewater pollutants to surface waters	discharge pollutants that overflow from a containment system you use due to a chronic or catastrophic rainfall if that containment system meets the following requirements. You must design, construct, and operate the containment system to hold all wastewaters generated from this process and the runoff from a rainfall of a size meeting the 25-year, 24-hour probability for your location.
		To a POTW	comply with 40 CFR 403	-----
Ducks	Existing	Directly	meet the following limits: <u>Pollutant</u> BOD ₅ Fecal Coliform	<u>Effluent limitations, Metric units (kg/1,000 ducks)</u> Maximum for any 1 day Monthly average (30 days) must not exceed— 1.66 0.91 (1) (1) ¹ Not to exceed mpn of 400/100 ml at any time.
		To a POTW	comply with 40 CFR 403	-----
	New	Directly	not discharge process wastewater pollutants to surface waters	discharge pollutants that overflow from a containment system you use due to a chronic or catastrophic rainfall if that containment system meets the following requirements. You must design, construct, and operate the containment system to hold all wastewaters generated from this process and the runoff from a rainfall of a size meeting the 25-year, 24-hour probability for your location.
		To a POTW	not discharge process wastewater pollutants	discharge pollutants that overflow from a containment system you use due to a chronic or catastrophic rainfall if that containment system meets the following requirements and you comply with 40 CFR 403. You must design, construct, and operate the containment system to hold all wastewaters generated from this process and the runoff from a rainfall of a size meeting the 25-year, 24-hour probability for your location.

What do these terms mean?

(A) *Feedlot* means a concentrated, confined growing operation which feeds animals or poultry to produce meat, milk or eggs, or stables animals or poultry, in pens or houses, and the confinement area does not sustain crop or forage growth or production.

(B) *Process wastewater* means any wastewater generated from the process and any precipitation (rain or snow) which comes into contact with any manure, litter or bedding, or any other raw material or intermediate or final material or product used in or resulting from animal or poultry production or direct products (e.g. milk, eggs).

(C) *Wastewater generated from the process* means water used (directly or indirectly) in feedlot operation for any or all of the following:

- c Animal or poultry watering system spillage or overflow;
- c washing, cleaning or flushing pens, barns, manure pits or other feedlot facilities;
- c direct contact swimming, animal washing or spray cooling; and
- c dust control.

(D) *25 year, 24 hour rainfall event* means a rainfall event with a probable recurrence interval of once in twenty-five years, respectively, as the National Weather Service defined in Technical Paper Number 40, "Rainfall Frequency Atlas of the United States", May 1961, and subsequent amendments, or equivalent regional or state rainfall probability information developed from National Weather Service documents.

The Feedlots Effluent Limitations Guidelines are implemented through National Pollutant Discharge Elimination System (NPDES) permits. The regulations that define Concentrated Animal Feeding Operations (CAFOs) as point sources that are subject to the NPDES program can be found at 40 CFR 122.23 and Appendix B. The tables below summarize those sections.

You are a concentrated animal feeding operation for purposes of § 122.23 if:

You discharge because of a storm smaller than a 25 year, 24-hour storm event or for reasons not related to precipitation, AND				OR we may designate you if we find that you significantly contribute pollutants to the United States' waters.
		You confine more than the following numbers of animals, OR	You confine more than the following numbers of animals AND you either discharge pollutants:	
			Into navigable waters through a man-made ditch, flushing system or other similar man-made device, OR	
			Directly into the United States' waters which originate outside of and pass over, across, or through your facility or otherwise come into direct contact with the animals you confine,	
Cattle	Slaughter & Feeder	1,000	300	
	Mature dairy (whether milked or dry)	700	200	
Swine	each weighing over 25 kg (approx. 55 lbs.)	2,500	750	
Horses		500	150	
Sheep or Lambs		10,000	3,000	
Turkeys		55,000	16,500	
Chickens: Laying hens or broilers	with continuous overflow watering	100,000	30,000	
	with a liquid manure system	30,000	9,000	
Ducks		5,000	1,500	
Animal Units	1.0 x slaughter & feeder cattle + 1.4 x mature dairy cattle + 0.4 x swine over 25 kg + 0.1 x sheep + 2.0 x horses	1,000	300	

How will you decide whether to designate me as a concentrated animal feeding operation?

We may designate you if we find that you significantly contribute pollutants to the United States' waters AND

		You confine more than the following numbers of animals OR you discharge pollutants:	Into the United States' waters through a man-made ditch, flushing system or other similar man-made device, OR Directly into the United States' waters which originate outside of your facility and pass over, across, or through your facility or otherwise come into direct contact with the animals you confine
Cattle	Slaughter & Feeder	300	
	Mature dairy (whether milked or dry)	200	
Swine	each weighing over 25 kg (approx. 55 lbs.)	750	
Horses		150	
Sheep or Lambs		3,000	
Turkeys		16,500	
Chickens: Laying hens or broilers	with continuous overflow watering	30,000	
	with a liquid manure system	9,000	
Ducks		1,500	
Animal Units	1.0 x slaughter & feeder cattle + 1.4 x mature dairy cattle + 0.4 x swine over 25 kg + 0.1 x sheep + 2.0 x horses	300	

If we designate you, we will only require you to submit a permit application after we inspect your operation and if we determine that we could and should regulate you under the permit program.

What do these terms mean?

- (1) *Animal feeding operation* means a lot or facility (other than an aquatic animal production facility) that:
- (i) Has, does, or will stable or confine and feed or maintain animals (other than aquatic animals) for at least 45 days in any 12-month period, and
 - (ii) Does not sustain crops, vegetation, forage growth, or post-harvest residues in the normal growing season over any portion of the lot or facility.

For the purposes of these regulations, we consider two or more animal feeding operations under common ownership as a single animal feeding operation if they share a boundary or if they use a common area or system for waste disposal.

(2) *Concentrated animal feeding operation* means an "animal feeding operation" which meets the criteria described in the table above.

(3) *Manmade* means constructed by man and used to transport wastes.

Operations that are not identified as point sources in this regulation can be subject to limitations as a result of total maximum daily loads (TMDLs). TMDLs are developed by each state to further reduce pollutant loads to water-quality limited water bodies beyond the reductions that can be attributed to the technology and water quality limits instituted in point source permits for operations in that watershed. These requirements are discussed at 40 CFR 130.7.

In addition to regulatory programs, there are a number of voluntary programs intended to encourage non-point animal feeding operations to better control their manure and other wastes through guidance and funding. EPA's 319(b) grant program provides money to states to help them in implementing management programs for non-point sources. The Coastal Zone Management Act (CZMA) and Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) provide funding to states and territories to protect and manage coastal resources as long as they can demonstrate that their programs meet certain requirements. CZARA also directed EPA to provide guidance to the states. In response, the Office of Water issued the 1993 document Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (840-B-92-002). The U.S. Department of Agriculture (USDA) also provides funding and guidance to operators through its conservation programs.

EPA delegates implementation of the NPDES program to States once the States have been authorized. The States do not have to use the federal limitations as long as the limitations they require are at least as stringent as the federal limitations. A number of states have chosen not to use NPDES permits to regulate CAFOs, but have implemented their own program. In some cases, facilities receive non-discharge permits. About one third of the States have legislation prohibiting them from instituting controls more stringent than federal regulations ("Enforceable State Mechanisms For the Control of Nonpoint Source Water Pollution", Environmental Law Institute, 1997: <http://www.epa.gov/OWOW/NPS/elistudy/appendix.html>).

Sample permits from 28 States and Region 6 provide an idea of what features states are using to control Animal Feeding Operations. These sample permits include both general and individual permits, and include some state program permits as well as NPDES program permits. The following summary table is adapted from one developed for the Office of Wastewater Management, along with information from the Bureau of National Affairs, Inc. CD Summaries of New State Regulatory Activities (1993-1998) and additional data collected from state websites.

State /Region	Animal Size Ranges	Effluent Limits	O & M	Land Application	Nutrient or Waste Mgt. Plans	Monitoring	Record Keeping/ Reporting	Mortality Disposal	Siting
Georgia	same as federal	numeric discharge							distance to neighbors & water
Idaho	x	x incl. runoff limits	x		x	x	x		
Illinois	1000 AU +	x	x liner & freeboard reqts.	X	x (based on size)	x	x incl. groundwater		
Indiana	300 cattle 600 swine or sheep 30,000 poultry			x	x				
Iowa		x	x lagoon level maint.	X	x	x	x		x
Kansas	300 head + or smaller w/ lagoon or WQ problem	x based on 10 yr 24 hr storm	x operator training	x	x	x soil & groundwater	x	x (poultry)	x
Kentucky	new 1000 + swine or > 10% incr.		liners lagoon size	x	x	stream			distance to groundwater
Louisiana		x	x	x			x		
Maryland	8 AU +		phytase reqt; cost share	x	x				
Minnesota	10 AU + w/ change	x	x	x	x	x	x		
Missouri	Moratorium on new ops over 17,000 head	x	x Operator cert.	x		x	x	x	
Montana		x incl. disch. to groundwater	x	x			x		
Nebraska	25-1000 AU designated; 1000 AU + covered								
North Carolina	250 swine 100 cattle 75 horses 1000 sheep 30,000 poultry (liquid)	x	x	x	x	x	x	x	x
Ohio	1000 AU +			x	x				
Oklahoma			op. training BMPs	x	x	x	x	x	
Oregon	incl. dog kennels	x	x	x			x		
Pennsylvania	2 AU + /acre			x	x				
Region 6		x	x	x	x	x	x	x	x
South Carolina			operator cert.						
South Dakota		x	x	x		x	x	x	x
Texas									for air quality
Utah		x	x			x	x		
Vermont		x	x	x	x	x	x		
Virginia	300 AU + (liquid)		cert. program	x	x	x			
Washington		x w/ des. overflow	x		x	x	x		
Wisconsin		x incl. roof runoff; cost sharing	x	x	x	x			
Wyoming		x	x	x		x	x		

The information in the table above leads to the following preliminary conclusions. Most of the State permits have effluent limits based on the same 25 year, 24 hour containment standard identified in the existing federal regulations. Various operation and maintenance and land application requirements also appear to be rather common. Nutrient management plans, monitoring, recordkeeping and reporting are required less consistently. Dead animal disposal and siting requirements are relatively rare. Some additional information about State programs can be found in Chapter 9 of the document entitled “Preliminary Study of the Livestock and Poultry Industry.”

A number of other countries have instituted regulations to control animal feeding operation wastes as well. Canada appears to regulate animal feeding operations primarily at a local level. The most applicable federal law is the Fisheries Act, which prohibits discharges of “a deleterious substance” into waters that are or may be inhabited by fish (“Environmental Guidelines for Dairy Producers,” <http://www.agf.gov.bc.ca/resmgmt/fppa/pubs/enviro/dairy/dairy02.htm>). British Columbia has a Health Act, which regulates activities that may be a health hazard, and a Waste Management Act, which is intended to control pollution from agriculture. Local regulations may include siting including setbacks, construction requirements, and nuisances such as excessive noise.

The Netherlands instituted a Manure Action Program in 1987 (“The Manure Action Program in the Netherlands”, Conservation Focus, Vol. 4, No. 4, Aug., 1987). This program includes recordkeeping requirements, taxes on excess manure production, and the institution of manure banks to collect and distribute manure from farms that cannot dispose of the manure they produce. Regulations issued under the Soil Protection Act control land application based on phosphate levels by land type and saturation. The Fertilizer Act banned some swine and poultry operation expansion. The Netherlands also issued a National Environmental Policy Plan in 1989. The plan included regulation of ammonia emissions and the use of manure as a soil amendment. Under the plan, manure must be incorporated when applied and storage structures must be covered. These covers are subsidized.

Denmark issued an Action Plan in 1987. Denmark regulates the use of manure as a soil amendment. Operators must have and abide by a nutrient management plan, and application in autumn and to frozen ground is restricted. Storage structures must be constructed to hold 6 to 8 months of manure production.

III. Subcategorization

EPA identified 18 subcategories for the 1974 Feedlots effluent guideline. These subcategories were divided by the animal type raised and the type of housing used. Most of these subcategories merited the same requirements and are therefore listed together in the CFR. Duck operations were treated separately and received different limits. The regulation further segmented these subcategories using threshold values to identify large operations to which the rule would apply. The following table summarizes the subcategories covered by the rule.

<i>You raise:</i>	<i>In:</i>	<i>And have a capacity of at least:</i>
Beef Cattle	Open or housed lots	1000 slaughter steers and heifers
Dairy Cattle	Stall barn (with milk room); Free stall barn (with milking center); or Cowyards (with milking center)	700 mature dairy cattle (milkers or dry cows)
Swine	Open dirt or pasture lots; Housed, slotted floor; or Solid concrete floor, open or housed lot	2500 swine over 55 lbs.
Sheep	Open or housed lots	10,000 sheep
Horses	Stables (race tracks)	500 horses
Chickens	Houses	100,000 - with unlimited continuous flow watering systems
- broilers - layers (egg production) - layer breeding or replacement stock		30,000 - with liquid manure handling systems
Turkeys	Open or housed lots	55,000 turkeys
Ducks	Dry or wet lot	5,000 ducks
Any combination of slaughter steers and heifers, mature dairy cattle, swine over 55 lbs., and sheep		1000 animal units

What do these terms mean?

(A) *Open lot* means pens or similar confinement areas with dirt, or concrete (or paved or hard) surfaces which substantially or entirely expose animals or poultry to the outside environment except for possible small windbreaks or small shed-type shade areas that afford some protection. "open lot" means the same as the industry terms "cowyard" (dairy cattle), "pasture lot" (swine), and "dirt lot" (swine, sheep or turkeys), "dry lot" (swine, cattle, sheep, or turkeys).

(B) *Housed lot* means totally roofed buildings which may be open or completely enclosed on the sides and which house animals or poultry over solid concrete or dirt floors, slotted (partially open) floors over pits or manure collection areas in pens, stalls or cages, with or without bedding materials and mechanical ventilation. "housed lot" means the same as the industry terms "slotted floor" buildings (swine, beef), "barn" (dairy cattle) or "stable" (horses), "houses" (turkeys, chickens).

(C) *Stall barn* means specialized facilities where operators milk and feed producing cows and replacement cows in a fixed place.

(D) *Free stall barn* means specialized facilities which permit producing cows to move freely between resting and feeding areas.

(E) *Milk room* means milk storage and cooling rooms normally used for stall barn dairies.

(F) *Milking center* means a separate milking area with storage and cooling facilities adjacent to a free stall barn or cowyard dairy operation.

(G) *Dry lot* means a confinement facility for growing ducks with a dry litter floor cover and no access to swimming areas.

(H) *Wet lot* means a confinement facility for raising ducks which is open to the environment with a small shelter area, and with open water runs and swimming areas to which ducks have free access.

The existing regulation does not cover all stages or all types of animal production. The sectors that produce the most manure solids and nitrogen are covered to some extent. These sectors are beef and dairy cattle, swine, broiler and layer chickens, and turkeys (Soil and Water Quality, An Agenda for Agriculture, 1993, National Research Council). A number of animal types are not included in the existing regulation, but have been considered insignificant because of the numbers of animals and operations in comparison to the rest of the industry. Confined aquatic animals are not covered by this regulation because they have a separate definition as a point source (see 40 CFR 122). As written, the regulation does not apply to immature dairy cattle and swine under 55 lbs. Also, the rule only applies to chicken operations that use either unlimited continuous flow watering systems or liquid manure handling systems. Although we have found no comprehensive source of data to indicate the extent of use of either of these systems in this segment of the industry, critics have indicated that they represent a very small portion of the industry and that the rule leaves out many large chicken operations.

The regulation used threshold values to limit applicability to the larger operations. These threshold values are equivalent to 1000 animal units (AUs) as was defined for development of both the part 122 and part 412 regulations. Animal units are intended to normalize numbers of animals across animal types. USDA also uses animal units for various analyses. USDA's animal units are more detailed and updated than the ones used by EPA in the existing regulations. USDA defines an animal unit as 1,000 pounds of live weight of any given livestock species or any combination of livestock species (see EQIP regulations). This definition accounts for all sizes of animals, including young and mature animals of certain animal types. Liveweight is the actual weight (in lbs) of the animals in question. Since this changes, even on a day-to-day basis, animal units are used to determine an average over a reasonable period of time.

There are a number of options to consider for modification of these thresholds, beyond simply revising the numbers:

1. Base the thresholds on the existing EPA definition of an AU -
Keep the definition of an animal unit similar to the existing regulation. This option is inconsistent with USDA's definition and doesn't consider differences between segments of animal type subcategories.
2. Base the thresholds on USDA's definition of an AU -
USDA bases the definition of an animal unit for the EQIP program on live weight.

Alternatively, the thresholds could be based directly on live weight. Some States regulate feedlots based on the total weight of the animals confined. For example, Iowa regulates CAFOs based on animal weight. However, live weight would be difficult to use both in developing the regulations and in implementing the regulations, since this value is so subject to change.

3. Base the thresholds on manure produced (either weight or volume) -

Volume of manure produced is a key factor in determining the amount of storage required at the facility. These values should correlate closely with live weight values by animal type under typical feeding strategies. However, altering feeding strategies can reduce the amount of manure produced for the same number of animals.

4. Base the thresholds on amount of nutrients (nitrogen or phosphorus) produced - Nutrients produced would be a primary consideration if the manure is land applied. These values should correlate closely with live weight values by animal type under typical feeding strategies. However, altering feeding strategies can reduce the amount of nutrients produced for the same number of animals.

IV. Analytical Methods

Manure, soil, and receiving waters are not consistently sampled by this industry. Manure is infrequently sampled by some operators prior to landspreading to better approach agronomic rates. However, published reference values or old sampling results are frequently used to estimate these values. Iowa State University has developed guidelines for sampling manure for nutrient analysis (1995). However, sampling and analysis methods have not been standardized for this industry. Standardized methods allow one to compare different results and have confidence that the similarities or differences are accurate.

Although some wastewater samples may be dilute enough to be analyzed as a liquid, a small percentage of solids in a sample requires that the sample be analyzed as a sludge. Following is a list of methods that are currently used for sludge analysis for EAD regulatory work. Many of these methods are modified for use in analyzing sludge. If sampling was used to support a revised regulation, method development may be necessary to provide methods appropriate for the sample matrix and analyte concentrations in Feedlot samples.

Analyte	Methods
Total Kjeldahl Nitrogen	EPA Method 351.3 and Standard Methods 4500-N B or C plus 4500-NH3 C, E, or F*
Total Phosphorus	EPA Method 365.2 and Standard Method 4500-P B(5), E*
BOD	EPA Method 405.1 and Standard Method 5210 B*
COD	EPA Methods 410.1 or 410.2 and Standard Method 5220 C*
pH	SW-846 Method 9045
TSS	EPA Method 160.2 and Standard Method 2540 D
Nitrate/Nitrite	EPA Methods 353.1 or 353.2 and Standard Methods 4500-NO3 F or H*
Ammonia as Nitrogen	EPA Method 350.2 and Standard Methods 4500-NH3 B,C; B, E; or B, F*
TOC	Lloyd Kahn Method: "Determination of Total Organic Carbon in Sediment"
Sulfide	SW-846 Method 9030 A
Fluoride	EPA Method 340.2 and Standard Method 4500-F B, C*
Chloride	EPA Methods 325.1 or 325.2 and Standard Method 4500-Cl E*
Total Cyanide	EPA Method 335.2 and Standard Method 4500-CN C, E*
Amenable Cyanide	EPA Method 335.1 and Standard Method 4500-CN G, C, E*
HEM/SGT-HEM (Oil and Grease/TPH)	EPA Method 1664
Total Recoverable Phenolics	EPA Methods 420.1 or 420.2*
Metals (including Al, Fe, Ni, Cu, Zn, As, & K)	EPA Method 1620, EPA Method 200.7, or EPA Method 200.9
Fecal coliform	Standard Methods 9221 E and 9222 D
Pesticides or herbicides	EPA Method 1656 (Organo-Halide Pesticides), EPA Method 1657 (Organo-Phosphorus Pesticides), or EPA Method 1658 (Phenoxy-Acid Herbicides)
Chlorinated dioxins and furans	EPA Method 1613
Fecal streptococcus	Standard Methods 9230 B and 9230 C

**Modified for sludge*

Iowa State University. 1995. Land Application for Effective Manure Nutrient Management. Pm-1599. October 1995. Iowa State University Extension. Ames, IA.